



UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/520,149 03/07/00 MURAKAMI

H 00169/P16954

WENDEROTH LIND & PONACK LLP
2033 K STREET NW
SUITE 800
WASHINGTON DC 20006

MMC2/0517

EXAMINER

Perez, G

ART UNIT

PAPER NUMBER

2834

DATE MAILED:

05/17/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/520,149

Applicant(s)

MURAKAMI ET AL.

Examiner

Guillermo Perez

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-48 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 March 2000 is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: .

DETAILED ACTION

Drawings

Figures 17-20 should be designated by a legend such as --Prior Art-- because only that, which is old, is illustrated. See MPEP § 608.02(g).

Double Patenting

Applicant is advised that should claims 13-15, 33 and 43 be found allowable, claims 44-48 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 5-6, 16-19, 21-22, 24-25 and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted Prior Art (APA) in view of Takahashi (EP 0642210 A1).

APA discloses a permanent magnet synchronous motor having a stator with a concentrated winding wherein a permanent magnet in the rotor comprises a ferrite magnet. APA discloses that the stator comprises a divided core and that the motor is

driven in a sensor-less operation. However, APA does not disclose that relations of $0.3 L_g < L_a < 2.0 L_g$, and $2 L_g < L_b < 5 L_g$ are established,

where L_a is a clearance between teeth of the stator;

L_b is a depth of a tooth edge; and

L_g is an air-gap between the stator and a rotor. APA does not disclose that the motor drives a compressor used in one of an air-conditioner and an electric refrigerator.

Takahashi discloses that a relation of $0.3 L_g < L_a < 2.0 L_g$ is established,

where L_a is a clearance between teeth of the stator; and

L_g is an air-gap between the stator and a rotor (column 13, lines 16-38).

Takahashi discloses that the motor drives a compressor used in one of an air-conditioner and an electric refrigerator (column 1, lines 15-18). Takahashi's invention have the purpose of facilitating manufacturing of the electric motor.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the relation and the application disclosed by Takahashi for the purpose of facilitating manufacturing of the electric motor.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a relation between a depth of a tooth edge and the air-gap between the stator and a rotor since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

2. Claims 4, 20, 23, 26 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Maruyama et al. (U. S. Pat. No. 6,194,800 B1).

APA discloses a permanent magnet synchronous motor having a stator with concentrated windings. APA discloses that a permanent magnet in the rotor comprises a ferrite magnet. APA discloses that the stator comprises a divided core. APA discloses that the motor is driven in a sensor-less operation. However, APA does not disclose an edge of at least one end of a tooth of the stator, the edge facing to a rotor, is cut away, and another side edge to the rotor is protruded for maintaining a depth of a tooth end.

Maruyama et al. disclose in figure 26 that an edge (25) of at least one end of a tooth (23a) of the stator, the edge facing to a rotor (21), is cut away, and another side edge (26) to the rotor (21) is protruded for maintaining a depth of a tooth end. The invention of Maruyama et al. have the purpose of reducing eddy current loss and the heat generated.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the stator of Maruyama et al. for the purpose of reducing eddy current loss and the heat generated.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

3. Claims 7-8, 10, 27-28, 30, 37-38, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Asai (JP 406245418A).

APA discloses a permanent magnet synchronous motor having a stator with a concentrated winding. APA discloses that the motor is driven in a sensor-less operation. However, APA does not disclose that outer walls on both end sections in a rim direction of a permanent magnet disposed inside a rotor along a rotor rim are tapered inward from the rotor rim in a radial direction and form a recessed section. APA does not disclose that a relation of $(1/10)A_s < A_m < (1/4)A_s$ is established,

where " A_m " is an opening angle of a recessed section with regard to a center of the rotor; and

" A_s " is an opening angle of teeth of the stator. APA does not disclose that the permanent magnet is mounted on an outer wall of a rotor core, and a recessed section is formed at an open space from where both the end sections of the permanent magnet are cut away in the rim direction. APA does not disclose that the motor is used to drive the compressor of a A/C or refrigerator.

Asai discloses that outer walls on both end sections in a rim direction of a permanent magnet (62) disposed inside a rotor (7) along a rotor rim (71) are tapered inward from the rotor rim (71) in a radial direction and form a recessed section (62a). Asai discloses that the permanent magnet (62) is mounted on an outer wall of a rotor core (61), and a recessed section (62a) is formed at an open space from where both the end sections of the permanent magnet (62) are cut away in the rim direction. Asai's invention have the purpose of preventing an increase in gap loss.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the permanent

magnets and recessed sections of Asai for the purpose of preventing an increase in gap loss.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to establish a relation between an opening angle of a recessed section and an opening angle of teeth of the stator since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

4. Claims 9, 11-12, 29, 31-32, 39, 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Asai as applied to claim 7 above, and further in view of Tanimoto (JP 405304737).

APA and Asai disclose a permanent magnet synchronous motor as described on item 3 above. However, neither APA nor Asai disclose that an inner wall of the permanent magnet facing a radial direction is flat face for increasing a depth of a center section of the permanent magnet in the rim direction. Neither APA nor Asai disclose that the permanent magnet is buried in a rotor core along a rotor-core rim, and a cut-away section is formed at a section corresponding to both the end sections of the permanent magnet in the rim direction. Neither APA nor Asai disclose that the permanent magnet is

buried in a rotor core along a rotor-core rim, and a slit is formed at a section corresponding to both the end sections of the permanent magnet in the rim direction.

Tanimoto discloses in figure 8 that an inner wall of the permanent magnet (36) facing a radial direction is flat face for increasing a depth of a center section of the permanent magnet (36) in the rim direction. Tanimoto discloses in figure 7 that the permanent magnet (26) is buried in a rotor core (22') along a rotor-core rim, and a cut-away section (a) is formed at a section corresponding to both the end sections of the permanent magnet (26) in the rim direction. Tanimoto discloses that the permanent magnet (26) is buried in a rotor core (22') along a rotor-core rim, and a slit (a) is formed at a section corresponding to both the end sections of the permanent magnet (26) in the rim direction. Tanimoto's invention have the purpose of reducing unnecessary cogging torque.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and Asai and provide it with the permanent magnets and slits as described by Tanimoto for the purpose of reducing unnecessary cogging torque.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

5. Claims 13-15, 33 and 43-48 rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Asano et al. (U. S. Pat. No. 6,218,753 B1).

APA discloses a permanent magnet synchronous motor having a stator with a concentrated winding. APA discloses that the motor is driven in a sensor-less operation. However, APA does not disclose that a reversely arced permanent magnet having a curvature-center outside a rotor in a radial direction is buried in a rotor core along a rotor-core rim, and a magnet-end facing to a rotor rim is situated inside the rotor rim in a radial direction, and a slit is formed on the rotor at a section corresponding to the magnet-end. APA does not disclose that a relation of $L_g < Q < 3 L_g$ is established,

where Q is a distance between the end of the permanent magnet and the rotor-core rim; and

L_g is an air-gap between the stator and the rotor. APA does not disclose that a relation of $(1/10)A_s < A_m < (1/4)A_s$ is established,

where " A_m " is an opening angle over a width of one of the cut-away section and the slit corresponding to the end of the permanent magnet with regard to a rotor center; and

" A_s " is an opening angle of teeth of the stator.

Asano et al. disclose in figure 1 that a reversely arced permanent magnet (14) having a curvature-center outside a rotor (11) in a radial direction is buried in a rotor core along a rotor-core rim, and a magnet-end facing to a rotor rim is situated inside the rotor rim in a radial direction, and a slit (30) is formed on the rotor at a section corresponding to the magnet-end. The invention of Asano et al. have the purpose of providing the motor with a stable driving torque.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the permanent magnets and slit as disclosed by Asano et al. for the purpose of providing the motor with a stable driving torque.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to establish a relation between the distance from the end of the permanent magnet to the rotor-core rim "Q" and the air-gap between the stator and the rotor. Also it would have been obvious to establish a relation between the opening angle "Am" of the permanent magnet and the opening angle "As" of the teeth of the stator since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guillermo Perez whose telephone number is (703) 306-5443. The examiner can normally be reached on Monday through Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nestor Ramirez can be reached on (703) 308 1371. The fax phone

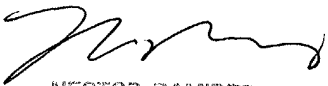
Application/Control Number: 09/520,149
Art Unit: 2834

Page 10

numbers for the organization where this application or proceeding is assigned are (703) 305 3432 for regular communications and (703) 305 3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

Guillermo Perez
May 7, 2001


NESTOR RAMIREZ
SUPERVISORY SENIOR EXAMINER
TECHNOLOGY CENTER 2000